

R E M A R K S

Reconsideration of this application, as amended, is respectfully requested.

ALLOWABLE SUBJECT MATTER

The Examiner's indication of the allowability of the subject matter of claims 12 and 13 is respectfully acknowledged. These claims, however, have not been rewritten in independent form at this time since, as set forth in detail hereinbelow, it is respectfully submitted that their respective parent claims, as amended, now also recite allowable subject matter.

THE SPECIFICATION

The specification has been amended to correct minor informalities of which the undersigned has become aware, including all of the informalities pointed out by the Examiner.

In addition, the abstract has been amended to better comply with the requirements of MPEP 608.01(b), as required by the Examiner.

It is respectfully submitted that no new matter has been added, and it is respectfully requested that the amendments to the specification be approved and entered, and that the objection to the specification be withdrawn.

THE DRAWINGS

Fig. 8 has been amended as indicated in red on the attached annotated sheet to correctly identify the bottom gate line with reference numeral 102, thereby overcoming the Examiner's objection to the drawings. Submitted herewith is a corrected sheet of formal drawing which incorporates the amendment. No new matter has been added, and it is respectfully requested that the Examiner's objection to the drawings be withdrawn.

THE CLAIMS

Claim 1 has been amended to clarify that the method of the present invention comprises a driving sequence as well as to incorporate the subject matter of claim 6, which has been canceled.

In addition, claim 11 has been amended to clarify the feature of the present invention whereby the charge accumulating period for each row is set to a different time.

And still further, each of claims 1-5 and 7-13 has been amended to make some grammatical improvements and/or to correct some minor antecedent basis problems so as to put the claims in better form for issuance in a U.S. patent.

No new matter has been added, and it is respectfully requested that the amendments to the claims be approved and entered.

THE PRIOR ART REJECTION

Claims 1-4 and 5-9 were rejected under 35 USC 102 as being anticipated by USP 5,461,419 ("Yamada et al"), and claims 10 and 11 were rejected under 35 USC 103 as being obvious in view of Yamada et al with USP 6,429,898 ("Shoda et al") and USP 4,870,493 ("Izawa et al"), respectively. These rejections, however, are respectfully traversed with respect to the claims as amended hereinabove.

According to the present invention as recited in amended claim 1, a drive control method is provided for a photosensor array including a plurality of rows, each having a plurality of photosensors arranged to form a matrix, wherein the method comprises a driving sequence which includes applying a reset pulse to a predetermined row of the photosensor array to initialize the plurality of photosensors in the row; accumulating charges generated by light irradiation during a charge accumulation period; applying a predetermined pre-charge pulse to the plurality of photosensors during a pre-charge operation; and applying a read pulse to the plurality of photosensors of the row after completion of the initialization, after the charge accumulating period, and after the pre-charge operation, to output the voltage generated by the charges accumulated during the charge accumulating period as an output voltage; wherein timings of applying the reset pulse, the

pre-charge pulse and the read pulse to each row are set not to overlap in time with each other, the charge accumulating periods for the rows are set to have a period equal to one of an application time and an integer multiple of the application time of the read pulse for each row, and the charge accumulating periods have an overlapping period between at least two different rows.

With this method, the overlapping charge accumulating periods of the at least two different rows allow the photosensors of each row to perform their reading operations at the same time. And because the applications of the pre-charge pulse and the read pulse are set not to overlap each other and because the charge accumulating periods are equal to or an integer number of times longer than the application time of the read pulse, even if the charge accumulation periods are set to be short such that they lapse before completion of application of the reset pulse to all of the rows of the photosensor array, the timings of the applications of the pulse to the rows do not overlap each other, the photosensors drive without influencing each other, and the set range of each of the charge accumulating periods can be increased.

As recognized by the Examiner, Yamada et al discloses a driving method of an optical/electrical converting system using a photosensor array in which photosensors are arranged in a matrix.

More specifically, Yamada et al discloses a driving method in which the top gate voltages Φ_{tg} of the rows are successively set to +5V to successively reset the photosensors of the rows. After the photosensors of each row are reset, and then a predetermined sense time period τ lapses, and a pre-charge voltage Φ_{pg} is applied, a bottom gate voltage Φ_{bg} is set at +10V to provide a selection state, and an output signal V_{out} from the photosensor is detected. Thereafter, the sense time period τ is changed, and the output signal V_{out} is detected by the same procedure. This operation is repeated to detect the output signal V_{out} for a number of charge accumulating periods, and to detect a critical sense time required for inversion to the output signal V_{out} . The photosensors of the rows of the photosensor array are set to successively perform the above operation.

It is respectfully submitted, however, that Yamada et al does not at all disclose, teach or suggest the features of the present invention as recited in amended claim 1 whereby the applications of the pre-charge pulse and the read pulse are set not to overlap each other, and the charge accumulating periods are equal to or an integer number of times longer than the application time of the read pulse.

In Yamada et al, after application of the pre-charge voltage Φ_{pg} , the bottom gate voltage Φ_{bg} is increased to a high level, and the output signal V_{out} is output. And it is considered that

the timing of application of the pre-charger Φ_{pg} is set so as not to overlap the timing at which the bottom gate voltage Φ_{bg} is increased to a high level. However, it is respectfully submitted that Yamada et al does not disclose any timing relationship between the pre-charge voltage Φ_{pg} and the top gate voltage Φ_{tg} . Accordingly, it is respectfully submitted that Yamada et al clearly does not disclose, teach or suggest the feature of the claimed present invention whereby the timings of the application of the pre-charge pulse and the reset pulse are set so as not to overlap each other.

Moreover, Yamada et al merely discloses that τ_1 and τ_2 of the rows are successively set to be shortened by a predetermined time period. Accordingly, Yamada et al does not disclose that the interval between times τ_1 and τ_2 is set to be equal or an integer number of times longer than the intervals at which the read pulse is applied to the rows.

Still further, it is respectfully pointed out that according to the present invention as recited in claim 10, the charge accumulating periods for the rows are set to be different from each other depending on the rows.

On pages 6-7 of the Office Action the Examiner acknowledges that Yamada et al does not disclose this feature of the present invention and for that reason the Examiner has cited Shoda for the missing teaching of Yamada et al.

Shoda et al discloses a driving technique for an imaging device comprising a two-dimensional array of photosensors 10, a vertical CCD and a horizontal CCD, wherein the accumulating period for even rows is set to be different from that of the odd rows, and wherein imaging is carried out in two accumulating periods (long and short accumulating periods). That is, Shoda et al discloses a driving technique whereby long and short accumulating periods are alternately applied to the rows of a two-dimensional array of photosensors.

By contrast, according to the present invention as recited in claim 10, the accumulating periods of the rows are set to be different from each other. For example, the accumulating periods for the first row to the n-th row can be set to increase gradually. And it is respectfully submitted that Shoda et al does not at all disclose, teach or suggest the feature of the present invention as recited in claim 10 whereby the accumulating periods of the rows are set to be different from each other.

Yet still further, it is respectfully pointed out that according to the present invention as recited in amended claim 11, the reset pulses are simultaneously applied to the rows of the photosensor array, and the charge accumulating period for each row is set to a different time.

On page 7 of the Office Action the Examiner acknowledges that Yamada et al does not disclose resetting all of the rows at

the same time. For this reason, the Examiner has cited Izawa et al for the missing teaching of Yamada et al.

It is respectfully submitted, however, that neither Yamada et al nor Izawa et al discloses the feature of the present invention as recited in amended claim 11 whereby the charge accumulating period for each row is set to a different time.

In view of the foregoing, it is respectfully submitted that amended independent claim 1, as well as each of claims 2-11 depending therefrom (together with allowable claims 12 and 13), all patentably distinguish over Yamada et al, taken singly or together with Shoda et al and Izawa et al, under 35 USC 102 and under 35 USC 103.

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Entry of this Amendment, allowance of the claims and the passing of this application to issue are respectfully solicited.

If the Examiner has any comments, questions, objections or recommendations, the Examiner is invited to telephone the undersigned at the telephone number given below for prompt action.

Respectfully submitted,



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PRIOR ART

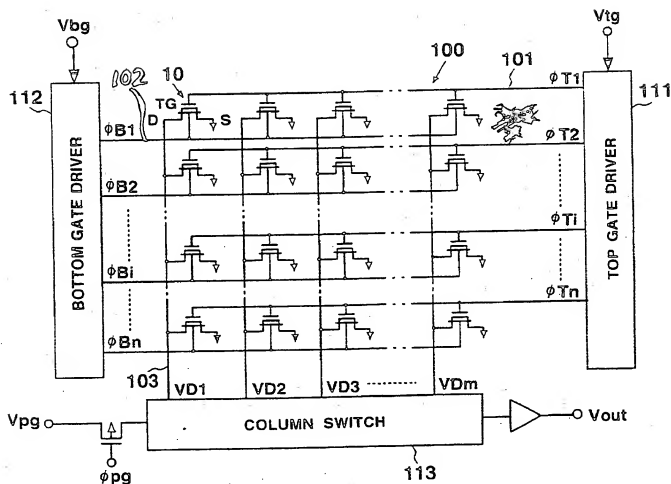


FIG.8